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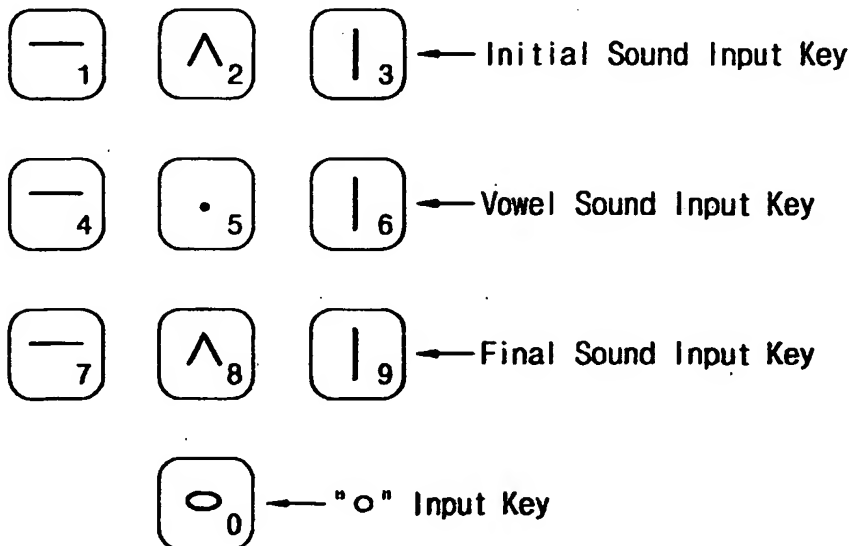
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(54) Title: SYSTEM FOR INPUTTING KOREAN CHARACTERS FOR THE ELECTRONIC APPARATUSES



(57) Abstract: The present invention relates to an apparatus for inputting Korean characters and, more particularly, to an apparatus for inputting Korean characters that can be applied to various mobile phones whose buttons are limited in number because various electronic instruments (e.g., personal computers) become smaller. The apparatus may include at least ten keys that consist of three initial sound input keys, three final sound input keys, three vowel input keys, and one "O" input key. Therefore, the apparatus enables a user to input Korean characters with the same order as a handwriting manner without memorizing its usage. Further, because the limited keys are used to input all Korean characters, the apparatus may be used as a small-sized keyboard or keypad of small-sized and multi-functional electronic equipments.

Title of Invention

SYSTEM FOR INPUTTING KOREAN CHARACTERS FOR THE
ELECTRONIC APPARATUSES

5 Technical Field

The present invention relates to an apparatus for Korean characters and, more particularly, to an apparatus for inputting Korean characters that can be applied to various mobile phones whose buttons are limited in number because various electronic instruments (e.g., personal computers) become
10 smaller.

Background Art

Unlike Japanese except English, French, German, and Chinese whose phonemes, i.e., alphabets are one-dimensionally (serially) disposed, each
15 phoneme of Korean is divided into the initial consonant of a Korean syllable, the vowels of the Korean syllable, and the final consonant of the Korean syllable. The initial consonant and the vowel or the initial consonant, the vowel, and the final consonant are two-dimensionally disposed to make one syllable.

20 Since one word is simply made by the order and space of the phonemes when inputting a character to an electronic equipment, the one-dimensional character can be inputted using a relatively simple character input protocol. However, when phonemes (of Korean) are two-dimensionally

disposed and two or more consonants except "ㅇ" are repeated (e.g., "윽이", "억기", and "여끼"), it is necessary to determine how to dispose the consonant in each syllable. Since 14 consonants exist and unlimited vowels theoretically exist, more complex protocols are required.

5 With the rapid progress of electric and electronic technologies, various electronic equipments such as mobile phones adopting CDMA, PCS, TDMA, GSM, AMPS, and IMT-200, a PDA, a pager, a small-sized game machine, a remote controller, a camera, and home electronic appliances trend toward small-size and high-tech. As functions of the electronic equipment
10 have been improved while trending toward small-size and the desire for inputting characters to the electronic equipment have been increased, a necessity for inputting characters have continuously been increased. To meet this necessity, various methods (devices) for inputting Korean to a button (key) limited mobile phone have been developed. In early Korean input
15 devices, all consonants are displayed in a liquid crystal (display device) in a Korean input mode. At this time, a user selects one consonant using a cursor, and then moves the cursor to select one of vowels displayed therein. Finally, one syllable is determined (Korean Patent Application No. 99-24320). In improved Korean input devices, symbols "ㅡ", "ㄴ", and "ㅣ" extracted from
20 basic morphemes of each vowel are allocated to three buttons, respectively. All vowels are inputted by combination of the symbols "ㅡ", "ㄴ", and "ㅣ", which is so-called "Chun-Ji-In (means "heaven-earth-human") vowel input method (device)" (Korean Patent Application No. 97-2558).

The consonant input method is classified into a successive arrangement method, a function key using method, and a figure permutation method. In the successive arrangement method, two or three consonants are allocated to one key, and one consonant is decided according to pressing
5 times of a specific key for a predetermined time. In the function key using method, each principal consonant in shape is allocated to one key and two or three function keys are added. On the other hand, each unallocated consonant is inputted by pressing a similar consonant-allocated key and pressing a function key for a predetermined time. In the figure permutation method,
10 common-shaped figures (or symbols) that are morphologically extracted from disassembled consonants are allocated to keys, respectively. Each consonant is inputted by a combination of pressing each of the keys once or a few times.

The successive arrangement method is disclosed in Korean Patent
15 Applications No. 00-18394 and No. 00-41317. According to the applications, in a keyboard that consists of eight or eleven keys to which vowels and consonants are allocated in order or at random, one syllable is completed by sequentially selecting one consonant and vowel corresponding to times of pressing a specific key. Unfortunately, because a plurality of phonemes are
20 allocated to one key, it is complicated for a user to use this method. Further, the user must continuously observe the change of a phoneme displayed in a display device by pressing a key.

The function key using method is disclosed in Korea Patent

Applications No. 00-42231, No. 00-49346, No. 00-49347, and No. 00-54571.

The applications use a keyboard in which representative six or seven consonants are respectively allocated to keys, the above Chun-Ji-In three vowel phonemes or representative six vowels are respectively allocated to
5 five or six keys, and one or three function keys are added. Each unallocated phoneme is inputted by selecting an allocated predetermined phoneme and pressing a predetermined function key predetermined times for a predetermined time. Although the above keyboard is visually clear, more efforts and times are required for freely selecting unallocated phonemes with
10 rapidity.

The figure permutation method is disclosed in Korean Patent Application No. 00-17771. FIG. 1 illustrates a key arrangement diagram, and FIG. 2 illustrates a corresponding relationship between combinations of keys and phonemes. In order to decide one phoneme by pressing a key twice,
15 common figures extracted from disassembled consonants are used. However, the common figures are so abstractive that a user cannot use an input device without clearly memorizing all combinations of the figures and all relationships between the combinations and phonemes. Furthermore, in case that two or more consonants except "ㅇ" exist between vowels (i.e., in most
20 cases), a user must press a separate function key (e.g., a cursor moving key) so as to decide a desired syllable.

Disclosure of Invention

A purpose of the present invention is to provide an apparatus that inputs Korean characters by automatically deciding an arrangement of two or more successive consonants with the same manner as a handwriting manner without memorizing its usage.

The present invention for the above foregoing purpose relates to an apparatus for inputting Korean characters, which comprises a Korean character input unit, a database unit, and a syllable decision unit.

The Korean character input unit is a keyboard or a keypad having initial sound input keys consisting of first to third keys to which three basic figures extracted from shapes of Korean consonants are allocated, vowel input keys consisting of fourth to sixth keys to which three basic figures extracted from shapes of Korean vowels are allocated, final sound input keys consisting of seventh to ninth keys to which the same keys as the first to third keys are allocated, and a "○" input key. The Korean character input unit may additionally have special function keys (e.g., a send key, a pause key, various menu keys, etc.) that are necessary for conventional electronic equipments. Further, if necessary, the Korean character input unit may have a Korean-Number-English shift key and a special character input key.

The database unit stores information making an input signal by the "○" input key recognized as "○", information of Korean consonants except "○" coded by a permutation of an input signal by the initial sound input key or the final sound input key, and information of Korean vowels coded by a

permutation of an input signal by the vowel input key. The database unit may physically be RAM or ROM.

The syllable decision unit receives a signal from the Korean character input unit and searches the database unit to extract a consonant and a vowel
5 corresponding to the received signal, thereby completing one Korean syllable. More specifically, the syllable decision unit receives one or two or more signals from the initial sound input key or the "ㅇ" input key and one or two or more signals from the vowel input key or receives one or two or more signals from the initial sound input key or the "ㅇ" input key, one or
10 two or more signals from the vowel input key, one or two or more signals from the final sound input key, searches the database unit, and extracts a consonant and a vowel corresponding to the input signal, thereby completing a Korean syllable. The syllable decision unit may be construed as a program performing the same function as electric.

15 Also the syllable decision unit:

(A) extracts a consonant corresponding to an initial input key signal inputted shortly before inputting the vowel input key signal when the vowel input key is inputted after inputting one or two or more initial input key signals to decide the extracted consonant as an initial sound, extract a vowel
20 corresponding to a vowel input key signal inputted shortly before inputting the initial input key signal when the initial input key signal is inputted again after inputting the one or two or more vowel input key signals to decide the extracted vowel as a vowel and complete one Korean syllable, and uses a

currently inputted initial input key signal as a signal for an initial sound of the next Korean syllable; and

(B) extracts a consonant corresponding to an initial sound input key signal inputted shortly before inputting the vowel input key signal when the vowel input key signal is inputted after inputting the one or two or more initial input key signal to decide the extracted consonant as an initial sound, extracts a vowel corresponding to a vowel input key signal inputted shortly before inputting a final input key signal when the final input key signal is inputted after inputting one or two or more vowel input key signals to decide the extracted vowel as a vowel, extracts a consonant corresponding to a final sound input key signal inputted shortly before inputting the next initial sound input key signal to complete one Korean syllable, and uses a currently inputted initial input key signal as a signal for an initial sound of the next Korean syllable.

Brief Description of Drawings

FIG. 1 is a schematic key arrangement diagram in one example of a conventional apparatus for inputting Korean characters.

FIG. 2 is a table of a corresponding relationship between combinations of keys and phonemes in one example of a conventional apparatus for inputting Korean characters.

FIG. 3 is a schematic construction diagram of an apparatus for inputting Korean characters according to the present invention.

FIG. 4 is an example diagram showing a key arrangement of a Korean character input unit in an apparatus for inputting Korean characters according to the present invention.

FIG. 5A through FIG. 5C are a flowchart showing the steps of inputting Korean characters in an apparatus for inputting Korean characters according to the present invention.

Best Mode for Carrying out the Invention

The preferred embodiment of the present invention will now be described more fully with reference to accompanying drawings. The drawings or embodiment is merely one example of a device according to the present invention. Further, various modifications or changes may be made without departing from spirits of the invention using three basic morphemes of Korean consonants and three basic morphemes of Korean vowels and including three initial sound input keys, three vowels input keys, three final sound input keys, and one "ㅇ" input key.

FIG. 3 schematically illustrates a construction of an apparatus for inputting Korean characters according to the present invention. The apparatus includes a Korean character input unit, a database unit, and a syllable decision unit. The Korean character input unit is basically composed of an initial sound input key, a vowel input key, a final sound input key, and a "ㅇ" input key. The database unit for storing information of vowels or consonants each corresponding a combination of input keys. The syllable

decision unit completes a Korean syllable by receiving a signal of the Korean character input unit, searching the database unit, and extracting a consonant and a vowel corresponding to the received signal. Further, the apparatus may additionally include a device for temporarily storing the completed Korean syllable and a device for displaying a procedure of
5 deciding a Korean syllable.

In the apparatus for inputting Korean characters, all components are functionally divided for the operation of the invention, so that they need not be physically independent. For example, it will be understood that the
10 database unit and the syllable decision unit may be made of one monolithic program or part.

Further, it is apparent to a person skilled in the art that separate input keys and functions for inputting special characters such as quotation marks, a rest, and a period, shifting Korean-English-Number input, and making a
15 space may be added to the apparatus according to the invention.

In the preferred embodiment of the invention, basic figures extracted from Korean consonants are “—”, “^”, and “|”, and basic figures extracted from Korean vowels are “—”, “.”, and “|”. The basic figures are allocated to at least ten keys of a keyboard or a keypad, respectively. Based upon a
20 Korean syllable writing order, three keys of a first row are initial sound input keys to which the basic figures extracted from Korean consonants are allocated. Three keys of a second row are vowel input keys to which the basic figures extracted from Korean vowels are allocated. Three keys of a

third row are final sound input keys to which the basic figures extracted from Korean consonants are allocated. A "○" key is allocated to a final tenth key (see FIG. 4).

The following table 1 and table 2 show phonemes (consonants or
5 vowels) corresponding to input signal combinations of each initial sound, vowel, and final sound input key inputted from the Korean character input unit shown in FIG. 4. In this case, consonant and vowel coding information of table 1 is stored in the database unit.

TABLE 1

**Input Signal Order of Initial or Final Sound Input Keys and
Corresponding Consonant Phonemes**

Input Signal Order	Corresponding Phoneme	Input Signal Order	Corresponding Phoneme
—	ㄱ	— ㅏ	ㅑ
—	ㄴ	— —	ㅋ
— —	ㄷ	— — — or — — — or — — —	ㅓ
— — —	ㄹ	— — or — —	ㅕ
— —	ㅌ	○ or ○	ㅇ
— —	ㅍ	— ○	ㅈ
ㅏ	ㅓ	— — ○	ㅊ
○	ㅇ	— — ○	ㅍㅍ
— ㅏ	ㅑ	— ㅏ ○	ㅑㅑ

TABLE 2

**Input Signal Order of Vowel Input Keys and
Corresponding Vowel Phonemes**

Input Signal Order	Corresponding Phoneme	Input Signal Order	Corresponding Phoneme
.	ㅏ	. . -	ㅓ
. .	ㅑ	- .	ㅕ
.	ㅓ	- . .	ㅗ
. .	ㅕ	-	-
. -	ㅗ		
.	ㅗ	. -	ㅓ
. .	ㅑ	- . .	ㅕ
.	ㅓ	- . .	ㅗ
. .	ㅕ	- .	ㅓ
. - .	ㅑ	-	ㅓ
. - .	ㅑ		

5 Since the initial sound “ㅇ” has no phonetic value, this characteristic can be applied to the apparatus according to the invention. That is, when an initial input signal is generated from the vowel input key or a vowel input key signal is generated shortly after generating a final sound input key signal, a syllable decision unit can automatically process a “ㅇ” input key signal to
10 have been inputted shortly before inputting the vowel input key signal. This leads to conspicuous decrease in number of typing times.

Preferably, the apparatus according to the invention is additionally equipped with a system for alarming a user of abnormal situations that an initial sound cannot be decided because an initial input key is continuously
15 pressed, that a key signal of a non-predetermined combination is inputted, or

that a final sound input key signal is generated directly after pressing the initial input key.

FIG. 5A through FIG. 5C illustrate a flowchart a procedure of inputting a Korean character in the apparatus for inputting Korean characters according to the invention.

For convenience of the description, assuming that there is no abnormal input. Of course, to start inputting Korean characters, the apparatus must be exclusively used for Korean character input or have a function to shift to a Korean input mode.

Since an initial signal inputted from an input key of the Korean character input unit is an initial sound input key signal, it starts being permuted and stored as a signal for deciding an initial sound of an Nth syllable. If an initial sound input key signal is inputted, a syllable decision unit stores the signal as a permutation. Thereafter, if a final or initial sound input key signal is generated, the syllable decision unit decides an initial sound consonant of the Nth syllable and deletes the stored permutation. On the other hand, the initially inputted vowel input key signal starts being permuted and stored as a signal for deciding a vowel of the Nth syllable.

If the vowel input key signal is inputted, the syllable decision unit stores the vowel input key signal as a permutation. Thereafter, if final or initial input key signal is generated, the syllable decision unit decides a vowel of the Nth syllable for the permutation of the vowel input key signal and deletes the permutation of the vowel input key signal. If an initial input

key signal is generated following a vowel input key signal, the syllable decision unit decides an Nth syllable that consists of an initial sound and a vowel. On the other hand, the initially inputted initial sound input key signal starts being permuted and stored as a signal for deciding an initial sound of an (N+1)th syllable. If a final sound input key signal is generated following a vowel sound input key signal, the syllable decision unit stores the final sound input key signal as a permutation until an initial sound input key signal is inputted. Thereafter, if the initial sound input key signal is generated, the syllable decision unit decides a final sound consonant of an Nth syllable and deletes the stored permutation. Continuously, the syllable decision unit decides an Nth syllable that consists of an initial sound, a vowel, and a final sound. On the other hand, the initially inputted initial sound input key signal starts being permuted and stored as a signal for deciding an initial sound of an (N+1)th syllable.

The foregoing procedure is repeated to complete Korean syllables, words, and writings.

Industrial Usability

As described above, an apparatus for inputting Korean characters according to the invention decides consonants and vowels by combinations of three basic figures extracted from Korean consonants and three basic figures extracted from Korean vowels. The apparatus may include at least ten keys that consist of three initial sound input keys, three final sound input

keys, three vowel input keys, and one "○" input key. Therefore, the apparatus enables a user to input Korean characters with the same order as a handwriting manner without memorizing its usage. Further, because the limited keys are used to input all Korean characters, the apparatus may be
5 used as a small-sized keyboard or keypad of small-sized and multi-functional electronic equipments.

What is claimed is:

1. An apparatus for inputting Korean characters, comprising:

a Korean character input unit having initial sound input keys
5 consisting of first to third keys to which three basic figures extracted from
shapes of Korean consonants are allocated, vowel input keys consisting of
fourth to sixth keys to which three basic figured extracted from shapes of
Korean vowels are allocated, final sound input keys consisting of seventh to
ninth keys to which the same keys as the first to third keys are allocated, and
10 a "○" input key;

a database unit for storing information making an input signal by the
"○" input key recognized as "○", information of Korean consonants except
"○" coded by a permutation of an input signal by the initial sound input key
or the final sound input key, and information of Korean vowels coded by a
15 permutation of an input signal by the vowel input key; and

a syllable decision unit for receiving one or two or more signals from
the initial sound input key or the "○" input key and one or two or more
signals from the vowel input key or receiving one or two or more signals
from the initial sound input key or the "○" input key, one or two or more
20 signals from the vowel input key, one or two or more signals from the final
sound input key, searching the database unit, and extracting a consonant and
a vowel corresponding to the input signal, whereby completing a Korean
syllable.

2. The apparatus as claimed in claim 1, wherein the syllable decision unit:

(A) extracts a consonant corresponding to an initial input key signal inputted shortly before inputting the vowel input key signal when the vowel input key is inputted after inputting one or two or more initial input key signals to decide the extracted consonant as an initial sound, extract a vowel corresponding to a vowel input key signal inputted shortly before inputting the initial input key signal when the initial input key signal is inputted again after inputting the one or two or more vowel input key signals to decide the extracted vowel as a vowel and complete one Korean syllable, and uses a currently inputted initial input key signal as a signal for an initial sound of the next Korean syllable; and

(B) extracts a consonant corresponding to an initial sound input key signal inputted shortly before inputting the vowel input key signal when the vowel input key signal is inputted after inputting the one or two or more initial input key signal to decide the extracted consonant as an initial sound, extracts a vowel corresponding to a vowel input key signal inputted shortly before inputting a final input key signal when the final input key signal is inputted after inputting one or two or more vowel input key signals to decide the extracted vowel as a vowel, extracts a consonant corresponding to a final sound input key signal inputted shortly before inputting the next initial sound input key signal to complete one Korean syllable, and uses a currently

inputted initial input key signal as a signal for an initial sound of the next Korean syllable.

3. The apparatus as claimed in claim 1 or claim 2, wherein the
5 basic figures allocated to the initial sound input keys or the final sound input keys are $\bar{\text{—}}$, \wedge , and ! , and the basic figures allocated to the vowel input keys are $\bar{\text{—}}$, \cdot , and ! .

4. The apparatus as claimed in claim 3, wherein the database unit
10 stores information recognizing:

a Korean first consonant “ㄱ” when key signals of $\bar{\text{—}}$ and ! are sequentially inputted;

a Korean second consonant “ㄴ” when key signals of ! and $\bar{\text{—}}$ are sequentially inputted;

15 a Korean third consonant “ㄷ” when key signals of $\bar{\text{—}}$, ! , and $\bar{\text{—}}$ are sequentially inputted;

a Korean fourth consonant “ㄹ” when key signals of $\bar{\text{—}}$, ! , $\bar{\text{—}}$, ! , and $\bar{\text{—}}$ are sequentially inputted;

a Korean fifth consonant “ㅁ” when key signals of ! , $\bar{\text{—}}$, ! , and
20 $\bar{\text{—}}$ are sequentially inputted;

a Korean sixth consonant “ㅂ” when key signals of ! , ! , $\bar{\text{—}}$, and $\bar{\text{—}}$ are sequentially inputted;

a Korean seventh consonant “ㅅ” when a key signal of \wedge is

inputted;

a Korean eighth consonant “ㅇ” when a key signal of “ㅇ” is inputted; and

a Korean ninth consonant “ㅈ” when key signals of ㅡ and ㅏ are sequentially inputted.

5 5. The apparatus as claimed in claim 3, wherein the database unit stores information recognizing:

a Korean tenth consonant “ㅊ” when key signals of ㅣ, ㅡ, and ㅏ are sequentially inputted;

10 a Korean eleventh consonant “ㅋ” when key signals of ㅡ, ㅡ, and ㅣ are sequentially inputted;

a Korean twelfth consonant “ㅌ” when key signals of ㅡ, ㅡ, ㅣ, and ㅡ or ㅡ, ㅡ, ㅡ, and ㅣ or ㅡ, ㅣ, ㅡ, and ㅡ are sequentially inputted;

15 a Korean eleventh consonant “ㅍ” when key signals of , ㅡ, ㅣ, ㅣ, and ㅡ or ㅡ, ㅡ, ㅣ, and ㅣ are sequentially inputted;

a Korean final consonant “ㅇ” when key signals of ㅣ and “ㅇ” or “ㅇ” ㅣ and are sequentially inputted;

a Korean consonant “ㅓ” when key signals of ㅡ, ㅣ, and “ㅇ” are sequentially inputted;

20 a Korean consonant “ㅕ” when key signals of ㅡ, ㅣ, ㅡ, and “ㅇ” are sequentially inputted;

a Korean consonant “ㅗ” when key signals of ㅣ, ㅣ, ㅡ, ㅡ, and “ㅇ” are sequentially inputted; and

a Korean consonant “ㄲ” when key signals of $\overline{\text{—}}$, \wedge , and “O” are sequentially inputted.

6. The apparatus as claimed in claim 3, wherein the database unit
5 stores information recognizing:

a Korean vowel “ㅏ” when key signals of ㅏ and \cdot are sequentially inputted;

a Korean vowel “ㅑ” when key signals of ㅑ , \cdot , and \cdot are sequentially inputted;

10 a Korean vowel “ㅓ” when key signals of \cdot and ㅓ are sequentially inputted;

a Korean vowel “ㅕ” when key signals of \cdot , \cdot , and ㅕ are sequentially inputted;

15 a Korean vowel “ㅗ” when key signals of \cdot and $\overline{\text{—}}$ are sequentially inputted;

a Korean vowel “ㅛ” when key signals of \cdot , \cdot , and $\overline{\text{—}}$ are sequentially inputted;

a Korean vowel “ㅜ” when key signals of $\overline{\text{—}}$ and \cdot are sequentially inputted;

20 a Korean vowel “ㅠ” when key signals of $\overline{\text{—}}$, \cdot , and \cdot are sequentially inputted;

a Korean vowel “ㅡ” when a key signal of $\overline{\text{—}}$ is inputted; and

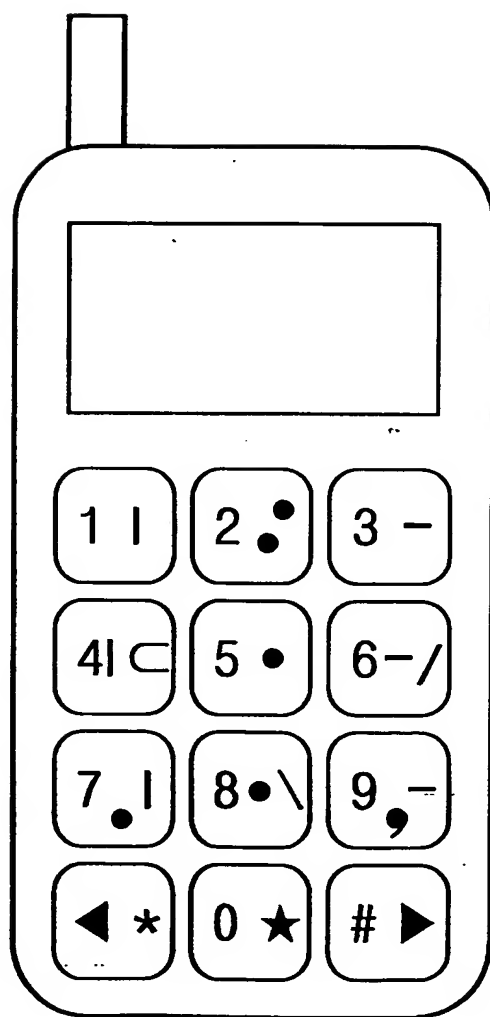
a Korean vowel “ㅣ” when a key signal of ㅣ is inputted.

7. The apparatus as claimed in claim 1 or claim 2, wherein the syllable decision unit processes the "O" input key signal to be inputted shortly before inputting a vowel input key signal when the vowel input key
5 signal is inputted shortly after inputting a final input key signal.

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Fig. 1

(Prior Art)



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Fig. 2

(Prior Art)

Basic Patterns of Korean Consonants and
Relationship between Consonant and Basic Pattern

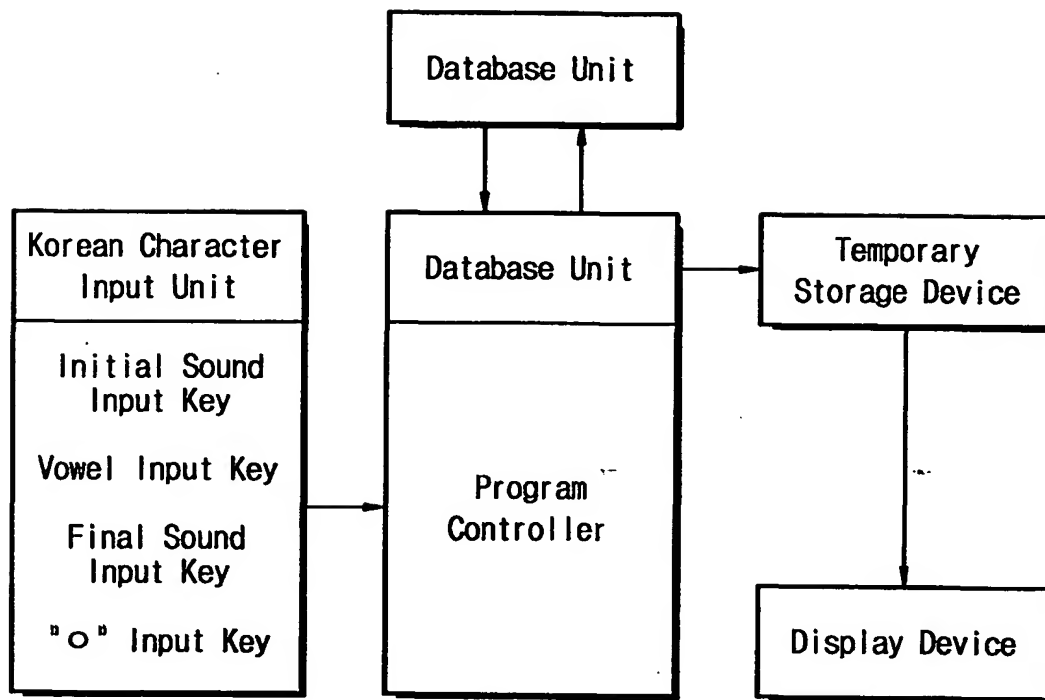
Basic Pattern of Consonant : 'ㅇ' 'ㄴ' 'ㄷ' 'ㄹ' 'ㅇㅇ'				
ㄱ : -	ㄴ : -	ㄷ : ㅇ _	ㄹ : - _	ㅁ :
ㅂ : ㅇ	ㅅ : ㅇ ㅇ	ㅇ : ㅇ ㅇ	ㅈ : ㅇ ㅇ	ㅊ : ㅇ ㅇ
ㅋ : ㅇ	ㅌ : - ㅇ	ㅍ : ㅇ _	ㅍ : - ㅇ	

Basic Patterns of Korean Vowels and
Relationship between Vowel and Basic Pattern

Basic Pattern of Vowel : 'ㅇ' 'ㄴ' 'ㄷ' 'ㄹ' 'ㅇㅇ'				
ㅏ : ㅇ	ㅑ : ㅇ	ㅓ : ㅇ	ㅕ : ㅇ	ㅗ : ㅇ _
ㅜ : ㅇ _	ㅠ : -	ㅡ : - ㅇ	- : _ _	ㅣ :

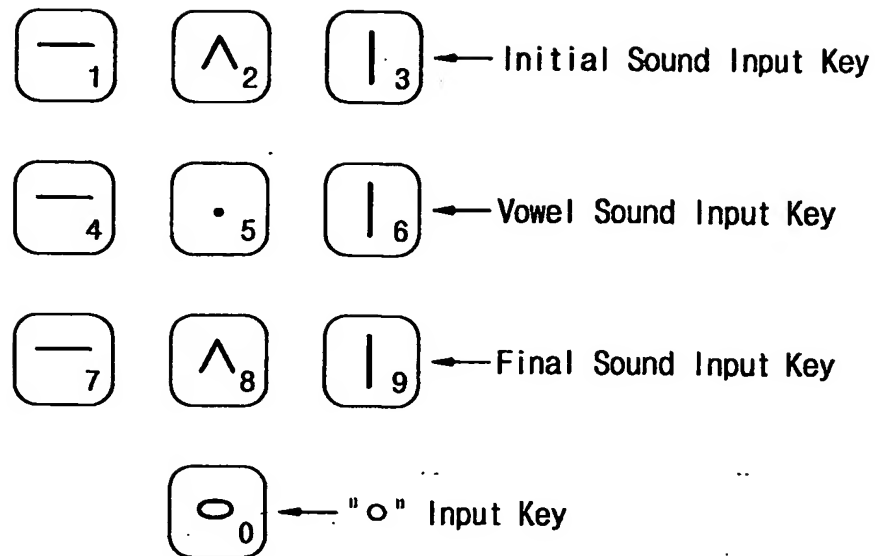
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Fig. 3



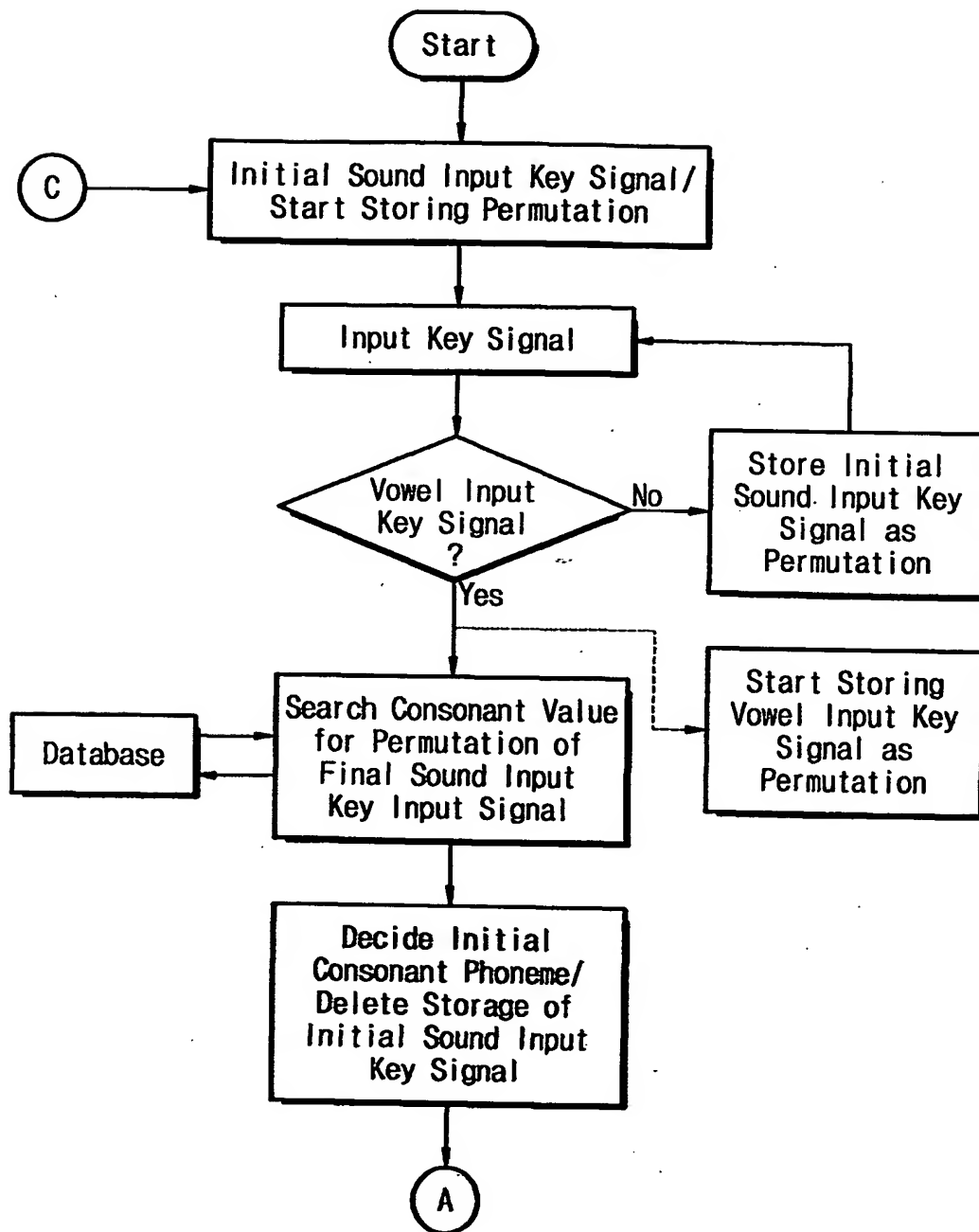
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Fig. 4



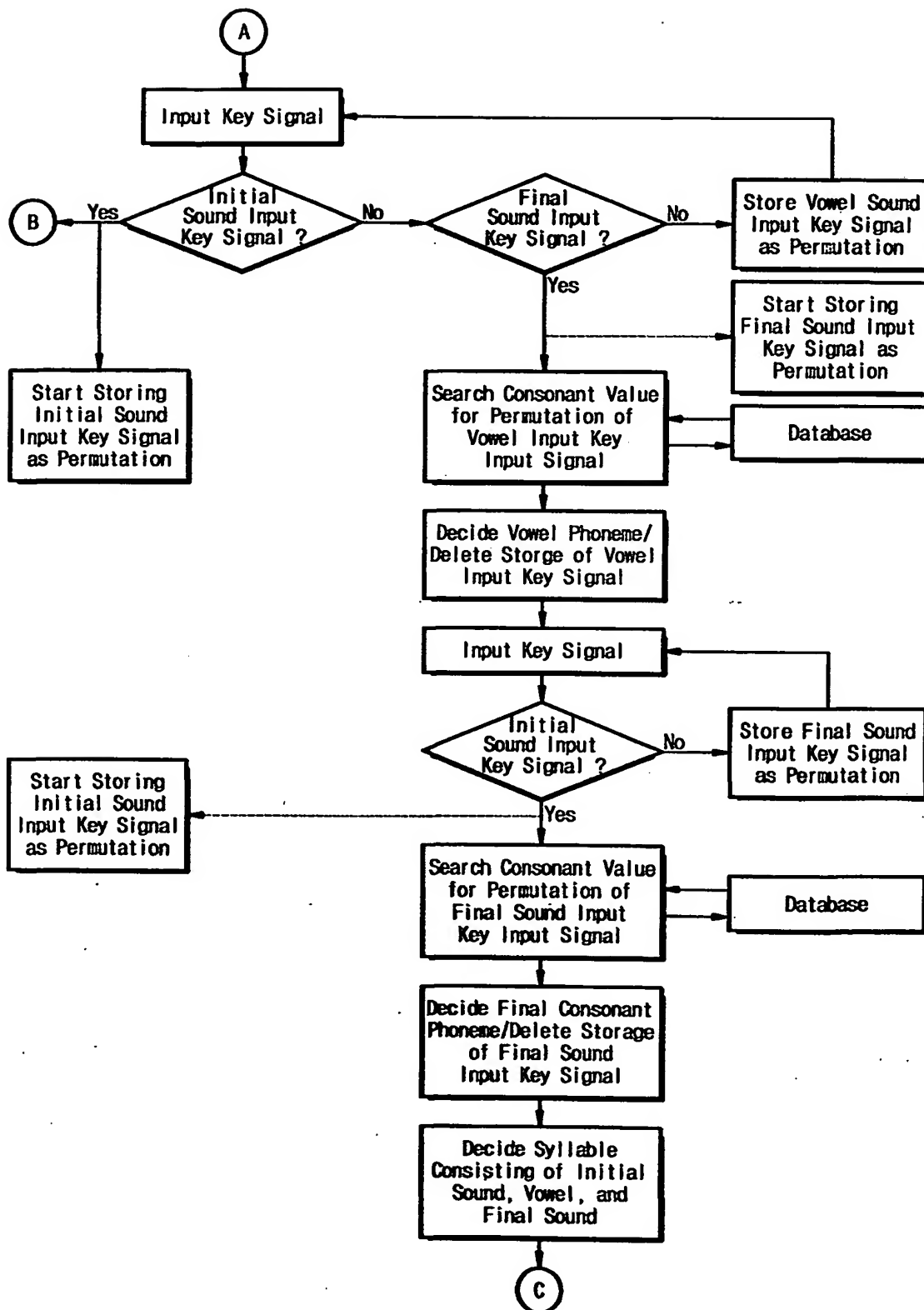
5/7

Fig. 5A



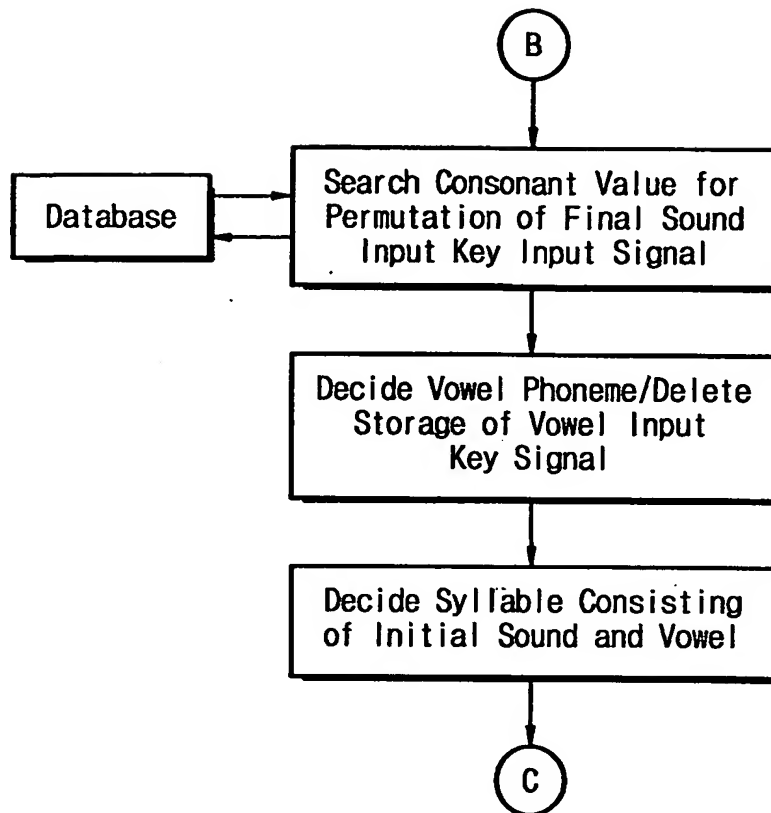
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Fig. 5B



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Fig. 5C



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR00/01140

A. CLASSIFICATION OF SUBJECT MATTER**IPC7 G06F 3/02**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC G06F 3/02, H04M 1/23

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patent and applications for inventions since 1975

Korean Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 97-2558 A (CHO, KWAN-HYUN) 28 JAN 1997 (28. 1. 1997) * whole documents	1-7
A	KR 00-17771 A (KIM, YONG-SUK) 6 APR 2000 (6. 4. 2000) * whole documents	1-7

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"Z" document member of the same patent family

Date of the actual completion of the international search

12 JULY 2001 (12.07.2001)

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